Park News & Planner

National Park Service
U.S. Department of the Interior

The Paisano

The official newspaper of
Big Bend National Park and the
Rio Grande Wild and Scenic River

Volume 26, No. 2 Winter 2005/2006

Dan Lewit

Folding in the area of the Ernst Tinaja

Written in Stone

WELCOME TO BIG BEND NATIONAL PARK AND THE RIO GRANDE WILD and Scenic River! Big Bend is one of the largest and least visited of America's national parks. Over 800,000 acres await your exploration and enjoyment. From an elevation of less than 2,000 feet along the Rio Grande to nearly 8,000 feet in the Chisos Mountains, Big Bend includes massive canyons, vast desert expanses, and the entire Chisos Mountain range.

Here, you can explore one of the last remaining wild corners of the United States, and experience unmatched sights, sounds, and solitude.

In this issue of the Big Bend Paisano, we explore the complex geologic and paleontologic resources of the Big Bend. While not as famous as other national park areas such as the Grand Canyon, Big Bend is a special place to study geology. The rocks are clearly exposed, thanks to sparse vegetation and recent erosion. A remarkable array of geologic processes are displayed here, from volcanoes and landslides to fossils and flash floods. Ross Maxwell, who studied Big Bend geology for over fifty years, once said, "as more and more time is spent in Big Bend country and more details worked out it becomes increasingly evident that we have only begun to read the story told in the rocks."

Superintendent's Welcome

Welcome to Big Bend National Park and the Rio Grande Wild & Scenic River, two of THE most special places administered by the National Park Service. We trust that you will have a wonderful time as you explore and experience these great parks.

Much of this issue of *The Paisano* is devoted to the geology and paleontology of these park units. Big Bend is often described as a geologist's paradise. Its complex geologic history presents a modern day challenge and adventure to students and researchers from around the globe. Big Bend is one of the true jewels for paleontological research in the world.

The fossil record here continues uninterrupted from the Age of Reptiles into the Age of Mammals. Over 90 dinosaur species, nearly 100 plant species, and more than two dozen fish, frogs, salamanders, turtles, crocodiles, lizards, and even early mammals have been discovered here, giving us one of the most complete pictures of a prehistoric ecosystem known anywhere on earth.

National parks like Big Bend belong to us all, and as such we have a shared stewardship role. Please be mindful of that as you spend time in YOUR national park. Leave only footprints and take only memories. Above all be safe.

John H. King

Superintendent John H. King

What's Inside

What is a Paisano?

Paisano is a spanish word meaning countryman or peasant that is used throughout the American southwest as a nickname for the roadrunner.

Remember:

- The speed limit on all park roads is 45 MPH, unless posted slower.
- Resource collecting is prohibited in Big Bend National Park. Be on the lookout for illegal collecting activities and report suspicious activities to a visitor center, or park ranger.

Emergencies

Call 911 or 432-477-2251 24-hours a day or contact a Park Ranger.

Visitor Information

8 What to See & Do

Find out how to make the most of your time in the park. Recommendations and suggested trip itineraries for one day, three day, or week long visits can be found here.

9 Day Hikes

Find descriptions of many of the most popular easy and moderate hiking trails here. A detailed description of each trail includes length, average time required, difficulty, and location.

16 Park Map

Don't know where you are? The park map can help. This page also includes a list of useful phone numbers for services both in and outside the park.

National Park Service
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Big Bend National Park

The Big Bend Paisano is published three times a year by the National Park Service and the Big Bend Natural History Association for the orientation and education of visitors to Big Bend National Park and the Rio Grande Wild & Scenic River.

National Park Service
Editor, Eric Leonard, Park Ranger
Chief Naturalist, David Elkowitz
Superintendent, John H. King

The National Park Service was established on August 25, 1916. . . "to conserve the scenery and the natural and historic objects and the wildlife. . . and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." Authorized by congress in 1935, and established in June 1944, Big Bend National Park preserves the most representative example of the Chihuahuan Desert ecosystem in the United States. As conservation educators, the park's Division of Interpretation and Visitor Services provides guided walks, talks, evening slide programs, workshops, and other educational activities as well as written materials such as this newspaper.

Big Bend Natural History Association
Executive Director, Mike Boren
Sales Manager, Tom Gaffaney
Assistant Sales Manager, Barbara Hines
Visitor Services Assistant, Anita Johnson

The Big Bend Natural History Association, established in 1956 as a private, non-profit organization, champions the mission of the National Park Service in facilitating popular interpretation of the scenic, scientific, and historic values of Big Bend and encourages research related to those values. The Association conducts seminars and publishes, prints, or otherwise provides books, maps, and interpretive materials on the Big Bend region. Proceeds fund exhibits, films, interpretive programs, seminars, museum activities, and research.

Photograph Credits
The Paisano proudly uses photographs of the park taken by visitors when possible. These photographs bear the photographer's name; all uncredited images are NPS photographs.

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The National Park Service cares for the special places saved by the American people so that all may experience our heritage.

EXPERIENCE YOUR AMERICA™

Big Bend and the Border

Viewing the sun set against the Sierra del Carmen mountains is a sublime Big Bend experience, underlined by the irony that the mountains aren't a part of the National Park; in fact, they aren't even located in the United States. In addition to defining the curve that forms the Big Bend, the Rio Grande also serves as the international boundary between the United States and Mexico. Throughout much of its history the border along the Rio Grande has often been fluid, allowing people of both countries to come and go as needed. However, the border is an artificial boundary imposed on the natural environment, and as such is subject to political and social pressures.

Increased border restrictions following the 2001 terrorist attacks have led to a number of important changes that affect the international boundary in Big Bend. A visit to Big Bend is a wonderful experience to learn about the park's history and to experience a wide variety of natural history and recreation options. The park's border with Mexico is part of our shared landscape and a chance to experience and learn about our neighbors. A few simple steps can help keep the park safe for everyone who is here.

Crossings Remain Closed
As a result of a 2002 US Customs and Border Protection decision, there are NO authorized crossings in Big Bend National Park. *Crossing at Boquillas, Santa Elena, or other locations along the Rio Grande is prohibited*. The closest legal ports of entry are Del Rio and Presidio, Texas.

The U.S. Attorney's Office has indicated that it will prosecute any criminal violations regarding any illegal crossings. If you re-enter the United States at any point within Big Bend National Park, you may be liable for a fine of not more than $5,000 or imprisonment for up to one year, or both.

When Visiting A Border Park
Big Bend National Park shares the border with Mexico for 118 miles. This is a remote region; however, each year hundreds of people travel north through the area seeking to enter the United States. Please keep the following in mind while visiting Big Bend:

• If you see any activity which seems to be suspicious, illegal, or out of place please do not intervene. Report it to a ranger as quickly as possible.

• It is possible you could encounter an individual or small group trying to walk through the park with little or no water. Please do not stop, but instead, immediately report such occurrences to a ranger. Lack of water is a life-threatening emergency in the desert.

Border Merchants
Mexican Nationals may approach you from across the river to purchase souvenir items (walking sticks, bracelets, crafts, etc.). If you agree to look at/or purchase their items and the Mexicans cross the river, they may be arrested for being in the U.S. illegally. They will be held until deported back to Mexico through Presidio (100 miles away). Mexican merchants will be arrested for illegal commercial operations which may result in a fine and/or additional incarceration while awaiting adjudication prior to deportation.

Items purchased will be considered contraband and seized by officers when encountered. Rocks, minerals, archeological items etc. cannot be purchased, imported, or possessed in the national park.

In addition, illegal trade impacts the resources of the park in a number of negative ways, including the creation of social trails, the cutting of cane along the river, erosion of riverbanks and an increased amount of garbage and contaminants along the Rio Grande watershed. Supporting this illegal activity contributes to continued damage of the natural resources along the Rio Grande, and jeopardizes the possibility of reopening the crossings in the future.

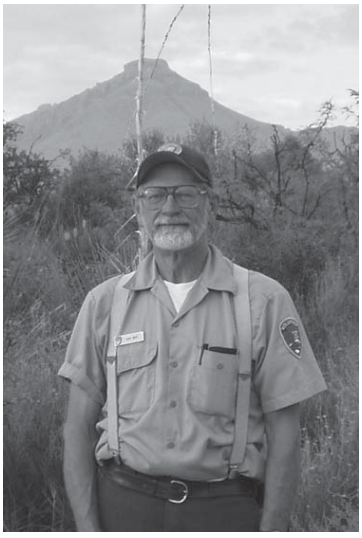
Volunteers in the Park

Last year over 320 volunteers contributed 48,634 hours of service to Big Bend National Park. Some service groups come for a few days, other volunteers stay for months. Some are students, others are retirees looking for adventure during their "golden years." Most of these volunteers work in visitor centers and as campground hosts; however, volunteers also help in science and resource management, maintenance, and administration. Regardless of age or background, these folks share a desire to make a positive contribution to the preservation and management of Big Bend National Park. Volunteers are a valuable and valued part of our operation and our community.

Volunteer Spotlight

Bob Wirt has volunteered over 9,000 hours to the National Park Service, and over half of those hours have been in Big Bend National Park. In Big Bend, he gets out in the field doing grass restoration and soil conservation projects for the Division of Science and Resource Management. This work is not glamorous, but labor intensive. It includes seeding the eroded areas in the northern sections of the park, protecting seeded areas with brush coverings, hauling brush for future seeding, monitoring and maintaining rain gauges and soil moisture sensors, maintaining appropriate records, and monitoring the progress of various projects.

Bob also has a deep interest in the park's cultural history, especially of the Castolon area. He does extensive research, searches for and documents historic and prehistoric sites, and conducts interpretive programs on the information he gathers.

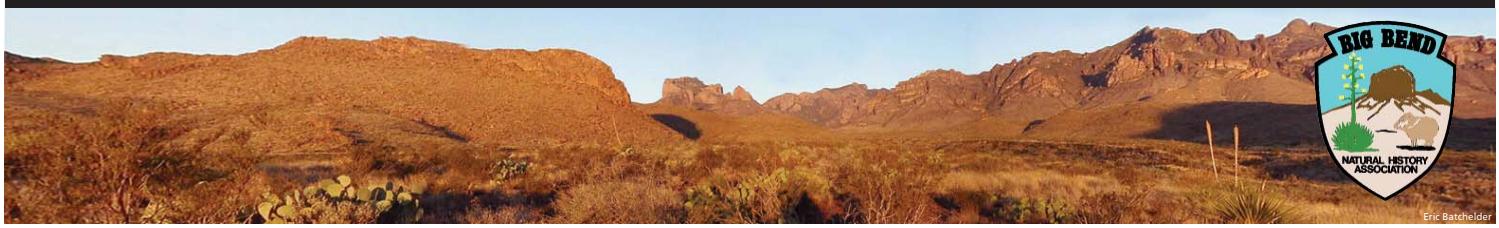


Honor Roll

Join us in thanking the following individuals and organizations who have recently donated 100 or more hours in volunteer service to Big Bend:

Madeline Averett
Steve Harper
Sally and Bob Jones
Joan and Jack Lamkin
Virginia and David Lynch
Terry Purvis
Carol Russell
Nicola Stringer
Steve Wick
Clara and George Willis
Bob Wirt

Big Bend Natural History Association



PO Box 196, Big Bend National Park, Texas 79834 432-477-2236 www.bigbendbookstore.org

What is the Big Bend Natural History Association?

The Big Bend Natural History Association (BBNHA) was established in 1956 as a private, non-profit organization. The Association's goal is to educate the public and increase their understanding and appreciation of the Big Bend Area and what it represents in terms of our historical and natural heritage. BBNHA champions the mission of the National Park Service of interpreting the scenic, scientific, and historic values of Big Bend and encourages research related to those values. The Association conducts seminars and publishes, prints, or otherwise provides books, maps, and interpretive materials on the Big Bend region. Proceeds fund exhibits, films, interpretive programs, seminars, museum activities, and research.

The Association's past and present projects include:

- Operate book sales outlets in Big Bend National Park and Amistad National Recreation Area
- Publish trail guides and brochures and assist with the publication of *The Big Bend Paisano*
- Sponsor an on-going Seminar program
- Provide annual grants for research projects and administer grants and gifts received for the park
- Support the park's volunteer, Junior Ranger, and educational outreach programs

What's New

We've made two major changes in the way we do business this year: we have a new online bookstore, and we have hired a contractor to conduct our seminar programs. The website is at the same address: www.bigbendbookstore.org , but we have a much improved site now with more options for purchasing books or membership, including the ability to pay for things with PayPal. The search engine is better, and existing members can establish an account which automatically calculates their discount in the pricing.

The seminar program will also remain much the same. We still decide what programs to offer and determine the annual calendar of events, but we have entered into a contract with Far Flung Outdoor Center (FFOC) of Study Butte, Texas, to conduct the day-to-day business of advertising, booking, and conducting the seminars themselves.

The 2006 seminar catalog should be out soon and will be available on our website and the FFOC website. The new place to book seminars will be: seminars@ffoc.net or 1-877-839-5337 or 1-432-371-3202.

Mike Boren, *Executive Director*

Featured Books

The Big Bend of the Rio Grande
Ross A. Maxwell. For years "the" definitive overall guide to the Big Bend. Overviews of geology, history, landscape, and settlers of the area of Big Bend National Park. Extremely useful for the scope of its coverage, and the magnificent fold-out geologic map of the area in the back sleeve is worth the price of the book by itself. $16.95

Big Bend Vistas: A Geological Exploration of the Big Bend William MacLeod. This recent book takes you along the highways in the Big Bend region describing and explaining mile by mile, with road logs, the geology and landscapes. $27.95

Down to Earth at Tuff Canyon
Daniel S. Barker. At Tuff Canyon along the Ross Maxwell Scenic Drive, water has carved a deep gouge through layers of ash, exposing lava beds beneath. This fascinating book tells about the geology, the plants, and the animals that inhabit this seemingly inhospitable area. $14.95

Geo-Texas: A Guide to Earth Sciences
Eric R. Swanson. Brings together astronomy, geology, meterology, oceanography, and environmental studies in a highly informative, one-of-a-kind guide to earth science in the Lone Star State. $15.95

The Field Guide to Geology
David Lambert and the Diagram Group. An innovative, clearly descriptive, and enjoyable introductory earth science book. $14.95

General Books

Big Bend: Official National Park Handbook
This full color book gives a brief introduction to the park and its history. It also contains a concise travel guide. $9.95

Big Bend: The Story Behind the Scenery
General overview of Big Bend's natural features. $9.95

Big Bend National Park Impressions
Brilliant color photos of the big panoramas and the small gems of the park. $9.95

Trip Planning and Park Information

Deluxe Trip Planner
Contains the following items: Road Guide, Backcountry Road Guide, Hiker's Guide, Park Handbook, Bird, Butterfly, Invertebrate, Mammal, and Reptile Checklists, Texas Highway Map, Chisos Mountains Trail Map, Terlingua-Chisos Map, and Nature Guide. A $26.50 value for $21.50.

Hiker's Guide to Big Bend National Park
Updated in 2005. Covers all major trails in the park, from short self-guiding nature trails to strenuous backpacking routes. $1.95

Road Guide to paved and improved dirt roads
Describes points of interest visible from all paved and improved dirt roads in the park. $1.95

Road Guide to backcountry dirt roads
Updated in 2004. Detailed mileage logs of Old Ore Road, Glenn Spring Road and River Road. Good descriptions of historic sites and scenery, human and natural history. $1.95

Guide Set—Best Value!
Buy all three guides together (hiker's & both road guides) and save! $5.00

River Guides
Printed on waterproof paper to ensure their long-term usefulness, this guide contains topographic strip maps showing both sides of the river. All rapids and major topographical features are labeled. General information river guide included with purchase. $3.00 ea.
Vol. 1: Colorado Canyon through Santa Elena Canyon
Vol. 2: Mariscal Canyon through Boquillas Canyon

Maps

Chisos Mountains Trails Map
A topographic map that includes all trails in the Chisos Mountains. Includes trail lengths and descriptions. 99¢

Trails Illustrated Topographic Map
The entire 1,200 square miles of Big Bend NP on one map! Backcountry and day hiking information. Waterproof and tearproof.
Scale 1:133333 $9.95

Join Us!

Become a member and create a lasting relationship with Big Bend National Park.

Member Benefits

Membership benefits include a 15% discount in BBNHA bookstores; a 10% discount on most seminars; a subscription to the *Big Bend Paisano*; a current Big Bend calendar; dicounts at many other association bookstores in other national park sites; and the opportunity to support scientific, educational and research prorams in Big Bend.

Do more with your dues!

Purchase a dual annual membership in both BBNHA and the Friends of Big Bend National Park for only $100.

Annual Dues
☐ Individual $50
☐ Associate $100
☐ Corporate $200
☐ Joint Membership (W/ FBBNP)

Life Membership
☐ Indvidual/Family $500
☐ Corporate $1000
☐ Benefactor $2500

☐ Renewal
☐ New Member

Name _____
Address _____
City _____ State _____ Zip _____
Make checks payable to BBNHA or charge to:
___ Visa ___ Mastercard ___ Discover
Card Number _____Exp. Date ____
Signature _____
Detach and mail to: Big Bend Natural History Association, PO Box 196, Big Bend National Park, Texas 79834
Telephone: 432-477-2236

You can also join online at www.bigbendbookstore.org

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Keep up with your favorite national park through a subscription to the park newspaper. **Note:** BBNHA Members already receive a subscription to the Paisano.
3 issues per year $10 (US & Canada)
International subscribers $35

Name:_____
Address:_____
City:_____
State, Zip:_____

Mail check or money order payable to BBNHA.

Detach and mail to:
Big Bend Natural History Association
PO Box 196
Big Bend National Park, Texas 79834

Park News

Park Website to be Overhauled

After ten years of virtual existence, the Big Bend website (http://www.nps.gov/bibe/) is about to undergo its biggest face-lift yet. The entire National Park Service website (nps.gov), including Big Bend's site, will undergo a site-wide change. At present, park webpages can be difficult to use, as organization, accuracy, and quality of expanded content varies widely from park to park. The new park website will include consistent, easy-to-use navigation, improved photo galleries, and a complete index. Most of the existing content, over 750 pages, will be transferred to the new site, and reorganized or updated as needed. In the future, additional multimedia presentations may be added as well. The new site should become active by February 2006, and by the end of next year all existing pages will be retired. Frequent users of the website should expect many bookmarked pages to change.

Food Storage Boxes installed at Rio Grande Village

This fall animal-proof food storage boxes were installed at all 100 sites of the Rio Grande Village campground. Visitors who have camped there in the past may recall that javelina can tear open tents looking for food scraps. The boxes now provide a better oportunity for all campers to properly store ice chests and food items where the wildlife cannot reach them. Over time this should vastly improve the visitor experience in the campground.

Water Cache Box installed at Blue Creek

This fall an animal-proof box was installed below the Homer Wilson Ranch/Blue Creek pull-off for use as water cache storage by visitors hiking the Outer Mountain Loop. In the past, the area adjacent to the old ranch buildings had been used by hikers to store water bottles; this practice led to damage and unauthorized use of the historic structures. The new water cache box will allow hikers a consistent, designated place for water storage when hiking this loop.

Any Park in a Storm

The effects of the hurricanes that struck the gulf coast this fall reached all the way to Big Bend. A small number of visitors traveled here to escape hurricane Katrina, and in late September some 300 visitors spent their evacuation time from hurricane Rita in Big Bend. National parks across the south and southwest waived entrance and camping fees for evacuees. Four park employees and members of the Diablos fire crew also participated in hurricane rescue and recovery efforts throughout the latter part of the year.

Top: **The new Big Bend website should debut early in 2006.**

Bottom: **The water cache box is located 100 yards below the Homer Wilson Ranch pull-off.**

Entrance Fees at Big Bend National Park

Why Do Parks Charge A Fee?
Much of the funding for Big Bend and other national parks comes from American taxpayers. However, protecting this land and ensuring that you have a safe, enjoyable and educational experience costs more than this tax base provides. Therefore, the U.S. Congress determined that people who use federal lands should pay fees to offset the difference.

Where Does Your Money Go?
Twenty percent of the money collected from entrance and campground fees is redistributed to units of the National Park System that do not charge fees to assist in the upkeep and upgrade of those areas. Eighty percent of the money stays in Big Bend National Park.

How Is Your Money Used?
Your entrance and campground fees help Big Bend National Park complete important projects that directly benefit you and other park visitors.

Recent Projects at Big Bend Made Possible By Your Fees:
- Reconstruction of the Rio Grande Village nature trail boardwalk
- Installation of a toilet at Hot Springs
- Develop a visitor center at Castolon
- Improvements to river access boat ramps

Future Projects:
- Major expansion of the Panther Junction visitor center
- Castolon historic district exhibits

Geologic Research in Big Bend

Geologist Don Corrick

ON THE SHOULDERS OF GIANTS

The dramatic and diverse geology of the Big Bend has attracted geologists for over a century. Early geological reports were published by R.T. Hill in 1902 and by J.A. Udden in 1907. These early studies by two legendary pioneers of Texas geology were an auspicious beginning for the study of a very complex and important region. In subsequent years many other geologists have contributed to our understanding of the area.

The most ambitious and important study thus far was undertaken by a group of four men led by Ross Maxwell, who also served as the park's first superintendent. Maxwell and his colleagues John T. Lonsdale, Roy T. Hazzard, and John A. Wilson worked on the area's geology between the 1940s and 1960s, finally publishing "*Geology of Big Bend National Park, Brewster County, Texas*" in 1967. This is the preeminent geologic report on Big Bend, and the foundation of geology interpretation in the park for over forty years. The geologic map that was published in the report is still available to park visitors as an insert in Ross Maxwell's "*Guidebook 7, The Big Bend of the Rio Grande*."

We still rely on this map and report today; but despite the excellence of this work, its authors faced handicaps that limit its usefulness in modern science. Most problematic was the lack of topographic maps at the time of the study. This resulted in the geologic map having distortions that cannot be corrected, so the geology cannot now be overlain onto topographic maps. Additionally, great advances in technology and geologic understanding have been made in the 50 years since this work was performed, providing new techniques for geologic study and new ideas about how the earth works.

A NEW MAP

The largest geology research project currently underway in the park is an attempt to create a new geologic map. Led by the U.S. Geological Survey, dozens of scientists are collaborating on the project, with some geologists dividing up mapping duties and other experts studying various specialized problems. The group includes USGS geologists, National Park Service geologists, and numerous university professors and their graduate students. The new map is an opportunity to consolidate the past half-century of geologic research in the park, much of which is unpublished. This fresh look at the park's geology will apply modern understanding of earth processes, and this will change some of the interpretations suggested by Maxwell and others. The park is already providing updated interpretations of some geologic features, such as Goat Mountain, by installing new roadside exhibits.

Perhaps most importantly, the new map will fit the topography, allowing it to be used in powerful computer-driven analyses, such as the Geographic Information System (GIS). GIS permits park managers to analyze the effects and interactions of all park resources, such as rocks, soils, plants, animals, water, and human history. Geology is a vital part of this analysis so the new map will fill a crucial need. For visitors interested in geology, the new map should be available in park bookstores in about two years.

DINOSAURS, VOLCANOES & OTHER RESEARCH

In addition to the big re-mapping project, a wide range of geologic research is currently underway in the park. Fossil studies include dinosaurs, large turtles, petrified wood, ancient mammals, and marine invertebrates called ammonites. The park's rich volcanic history has always been an area of research interest. Current topics include geologic history of the Pine Canyon caldera, the lava flows of the South Rim and Chisos formations, and detailed studies of igneous intrusions such as dikes and laccoliths. Graduate students and university professors are also studying the stratigraphy and deposition of various sedimentary rocks, including the Boquillas Formation, the Chisos Formation, and the Banta Shut-in Formation.

THE VALUE OF RESEARCH

Scientific research carried out in Big Bend and the other national parks provides a wide range of benefits. The public benefits from the insights that provide a better understanding of the natural world. Park managers use research to make science-based decisions about managing park resources, and scientists use information to further their own research. Interest in conducting research at a park is a measure of the scientific significance of park resources, and with over 100 annual permits, Big Bend National Park's research program is among the most active in the National Park System.

In Layman's Terms:
Geologic Highlights of the Ross Maxwell Scenic Drive

Ranger Angelina Yost

Have you ever been frustrated in your attempt to understand geological text in a book or exhibit? Many of us have. Here is an opportunity to take the Ross Maxwell Scenic Drive and learn, in layman's terms, about its many distinctive and unique geologic formations. It is a drive that mainly tells a story about the unnamed, small volcanic vents scattered throughout the western portion of the park. Allow for a good part of the morning or afternoon, especially if you choose to take the 12.8 mile gravel Old Maverick Road back.

Begin your tour at the beginning of the Ross Maxwell Scenic Drive, thirteen miles west of Panther Junction.

MILE 1

The low-lying, non-descript hills immediately surrounding you, colored tan to grey, sometimes covered with a dark brown layer, are sedimentary rocks from the late Cretaceous Period, deposited 88 to 65 million years ago (mya). Mostly shale, claystone, siltstone and sandstone, these deposits are easily eroded and are often covered by alluvium or gravel carried down from the taller mountains. Read the article on Cretaceous dinosaurs on page seven and learn about the environment which created these rocks. The rest of the tour will highlight volcanic features that are sitting on these sediments.

MILE 2

As you drive the first few miles of this road, the Chisos Mountains fill your windshield. The 'V' shaped notch in the middle of the mountains is the back side of the "Window." From mile two, the flat-topped mountain, Casa Grande, is centered through the Window. It is formed from layers of lava and ash possibly topped by a *volcanic dome*.

MILE 4

Notice the rock walls on your left, running down from the slopes of the Chisos Mountains at a 45 degree angle to the road. These ridges are dikes, *intrusive* magma which filled up cracks in the earth and solidified underground during the Basin and Range Faulting Period, 24 to 28 mya. In the intervening years, the softer overlying and surrounding sediments eroded away, exposing these parallel dikes.

MILE 8—BLUE CREEK RANCH OVERLOOK

Stop here to look at the old ranching house or to hike a mile up the canyon to the red rock formations. The red rocks represent another geologic mystery, as there is no explanation behind their formation at this time.

MILE 8.3—SOTOL VISTA OVERLOOK

Do not miss this spectacular view as the desert drops below you. As you gaze out from the viewing area, notice the cliff face, forming a long mesa that fills the western horizon. The cleft in the middle of this mesa is Santa Elena Canyon.

MILE 11.6

Turn here to hike the Lower Burro Mesa Pour-off Trail. From here the face of this mesa is well exposed, giving us a nice cross-section of what is currently theorized to be a *volcanic dome* complex. About 29 mya, several local volcanic vents spewed out red hot clouds of ash, rock fragments, and molten rock droplets (light bands), followed by thick, slow moving lava that formed into domes (dark bands). An exhibit at your next stop provides details on the volcanic dome theory.

MILE 14.8

Goat Mountain has long been a required stop for geology students visiting Big Bend. The roadside exhibit here details the most recent theory on the formation of Goat Mountain. The recent replacement of this exhibit is an example of how our interpretation of geology is constantly changing as we continue to learn from years of research.

MILE 15.5

Underground volcanic activity was pretty extensive 28-24 mya. Mule Ears are two eroded dikes from this time period. Did you notice all the brown hills and spires, on either side of the road, before and after the turn for Mule Ears? Igneous rock seeped to the surface through older layers of sediment and formed unusual shapes made up of a rock called *rhyolite*.

MILE 20—TUFF CANYON

This canyon was formed as run-off down Blue Creek carved through layers of *pyroclastic ash flows* and *surge-deposits*, deposited 29 mya, from a volcanic vent located on the east side of the road. Make sure to experience the dizzying view of the canyon from all three viewpoints.

MILE 20.5

Ash in the air from another nearby volcanic vent settled to form ashfall *tuff*, the material that composes these striking white hills that surround you. The black rocks sprinkled on top are the remains of a thin lava flow, basalt, possibly from the same vent.

MILE 21.1

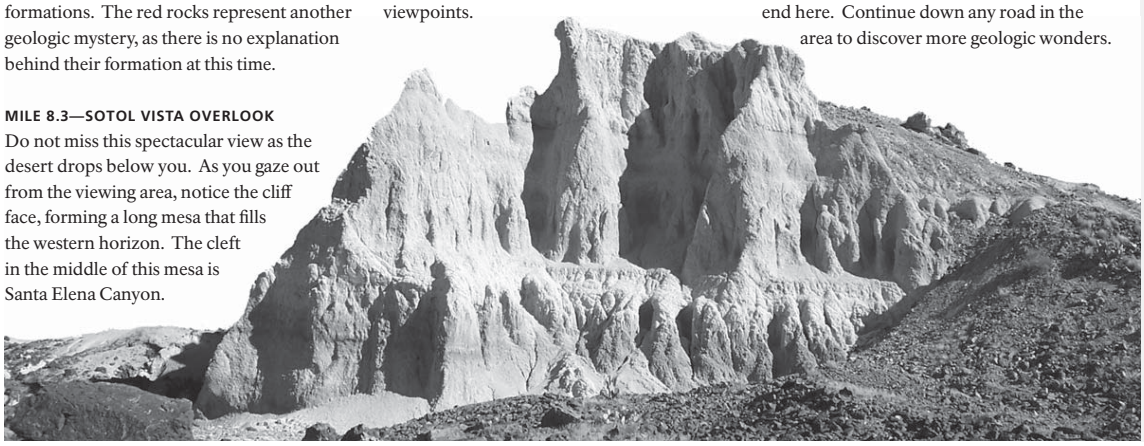
The layered mountain in front of you is Cerro Castolon. Although Cerro Castolon, Burro Mesa, and Goat Mountain are formed from three entirely different vents, they all have similar pyroclastic rock layers, topped by a lava dome. From top to bottom, the layers are *rhyolite*, *breccia*, and *basalt*.

SANTA ELENA CANYON

Travel down this trail to the base of these sheer cliff walls of limestone towering 1500 feet above you. Stop for a moment at one of the large boulders and look for fossils of shells that formed these walls. Imagine how many millions of years it would have taken to deposit all these tiny shells and form these enormous limestone cliffs. The limestone was deposited 144 to 88 mya.

There are many theories, and not very much evidence, on how the Rio Grande formed Santa Elena Canyon. One theory is that this area was once a large basin of water and faulting created a channel for the water to drain. Another theory is that previous rock layers that once sat on top of the limestone have channeled the river to its present location over the last few million years. To experience the canyon and its imposing rock walls, following the trail across Terlingua Creek.

The scenic tour of Big Bend geology does not end here. Continue down any road in the area to discover more geologic wonders.



Geology Terms

Basalt
Dark gray to black dense to fine-grained igneous rock, mainly found under the ocean, rich in iron and magnesium created by the partial melting of the mantle; basalt is runny as molasses when liquid and can flow long distances in thin sheets.

Breccia
Extrusive igneous rock consisting of sharp fragments embedded in a fine grain mixture such as sand or clay.

Extrusions
Igneous rock formed from magma that has erupted onto the surface of the earth; includes lavas, pyroclastic flows, and volcanic ash.

Granite
Silica-rich rock forming the make-up of most of the continents; intrusions are made of granite.

Igneous rock
A rock made from molten or partly molten material.

Intrusions
Igneous rock that has formed from a magma that never reached the earth's surface, but instead seeped in between pre-existing rock layers.

Lava
Magma that comes to the earth's surface through a volcanic vent or fissure.

Magma
Naturally occurring mobile rock material, generated within the earth and capable of being extruded and intruded, from which igneous rocks are derived through cooling.

Pyroclastic surge deposit
Hot clouds of particles and gas from a volcanic vent that swept over the ground surface rapidly in a turbulent flow.

Pyroclastic ash flow
Hot clouds of particles and gas that were denser than surges and moved in a sliding flow.

Rhyolite
The lava form of granite; very acid lava rock, fine grained, high in silica, which is quite viscous. If rhyolite does not contain water, it oozes out and creates volcanic domes. If rhyolite contains water, or comes in contact with water, the water becomes superheated and the lava explodes on release of pressure, creating clouds of dust and ash.

Tuff
A rock composed of consolidated or cemented volcanic ash; a mixture of clay and glass; includes ash-flow tuff and ash-fall tuff.

Volcanic dome
Extrusive igneous rock, composed of rhyolite, exposed to the surface from a volcanic vent, that oozed out but did not flow and cooled slowly.

Who was Ross Maxwell?

Ross Maxwell (1904-1993) served as the first superintendent of Big Bend National Park, from 1944-52. A research geologist, Maxwell first came to the Big Bend in 1936 to work on a geological survey of the region for the National Park Service. While superintendent, Maxwell laid out the route of the road today named in his honor to highlight the more spectacular geologic features on the west side of the park.

A Desert Sanctuary

The physiographic order of the Big Bend is somewhat like the order of a great city built of stone and brick—wrecked by an earthquake. Perhaps order once prevailed there, but some mighty force wrecked the place, shook it down, turned it over, blew it up, and set it afire. Evidences that all this happened exist on every hand, making the land the finest example of earth-wreckage in Texas.

Walter Prescott Webb, 1937

Big Bend National Park is much more than just a recreational destination. It is a sanctuary of natural and cultural resources—a living museum for all the world. Conserving this heritage is a task the National Park Service cannot accomplish alone. All of us serve a critical role in maintaining Big Bend's sanctuary for the future.

Keep wildlife wild. Human foods are not healthy for wildlife. Feeding wild animals is illegal and can cause injury or death to the animal. Keep food in a hard-sided vehicle or food storage locker where provided.

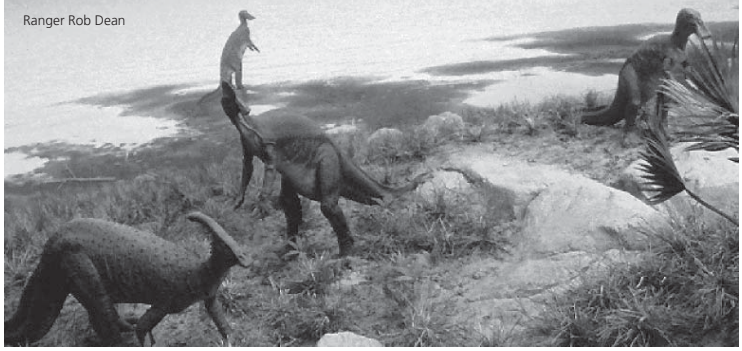
Please respect the peace and quiet of Big Bend's unique environment and protect the subtle sounds of nature by traveling quietly.

You are an important resource, too. Use common sense and good judgement to protect your own safety and take advantage of our educational programs to enhance your knowledge of Big Bend.

Collecting any natural or historical feature or object is strictly prohibited. Leave the park intact for others to enjoy. If you witness any collecting, report it to a park ranger as soon as possible.

A Dinosaur Tale

Ranger Rob Dean



Big Bend's rocks tell a fabulous story about dinosaurs. It is a mystery, the kind that never becomes completely solved. It is a tale of intrigue, violence, and fascinating characters that interact with changing environments, habitats, and ecosystems over many millions of years. The tale reveals itself unwillingly—researchers must pry the story from the rocks grain by grain, crystal by crystal, searching for answers.

The tale begins in the late Cretaceous about 84 million years ago when Big Bend became a landform. For many millions of years prior, Big Bend was underwater, as evidenced by the rich marine sedimentary deposits exposed in the canyons of Boquillas or Santa Elena. The great Western Interior Seaway, a shallow, dynamic waterway with an average depth of 200 meters, split North America into an eastern and a western landmass. As the landmass continued to emerge and the seas regressed, the land we call Big Bend became a shoreline complete with beaches, sand dunes, estuaries, bays, and breaking seas.

By geological standards, the Big Bend's dinosaur tale is a short story containing three chapters—a classic tale like Beowulf—strange and unusual beasts, characterized as magnificent giant monsters, meet a violent end after dominating the landscape. It is an important tale highlighting the late Cretaceous and the last 20 million years of the dinosaurian reign, making Big Bend's reptilian fauna the most significant in North America.

Chapter one concentrates on rocks of the Aguja (A-goo-ha) formation whose sediments were deposited as the ancient seaway retreated. Deposited between 84 and 74 million years ago, this 240 meter thick layer of limestone features a gradual faunal change from the bottom of the layer to the top. The lower portion of the Aguja deposits include marine fossils such as ammonites, clams and bivalves; the upper deposits exhibit fossils that lived in fresh water environments with the dinosaurs. Big Bend's best representative of the upper Aguja is a *Chasmosaurus mariscalensis*, one of the tri-horned dinosaurs.

Described by Dr. Tom Lehman, *C. mariscalensis* was a plant eater related to Triceratops. With a three meter skull adorned with horns and a scalloped frill, this imposing creature weighed up to three tons, was eight meters long and traveled in herds. Big Bend fossils include bone beds with adult, subadult, and juvenile individuals. What violent catastrophe destroyed this herd?

Other dinosaurs known from the Aguja formation include the hadrosaur *Kritosaurus navajovius*, a duck-billed plant eater. An egg layer, *K. navajovius*, was 10 meters long and four meters tall, weighed two tons, and may represent a major prey item for predators. Some lesser known specimens, based on fragmented fossil evidence, may include a pachycephalosaur, the dome-headed *Stegoceras*, a plant eater about two meters tall and weighing 200 pounds; and the ankylosaurid, *Euoplocephalus*, an armored plant eater weighing 2.5 tons, six meters in length, with a huge bony club at the end of its tail.

The Aguja chapter lasted about 10 million years, with the sea continuing its regression. The retreating sea exposed more landmass which facilitated environmental changes over time—the marine influence was replaced by freshwater habitats and features. Like missing pages in a novel, the Aguja does not tell its tale easily; fossils tend to be fragmented, disjointed, and broken up. Only a small portion of the dinosaur fauna will be represented. And so the mystery continues in the next chapter.

In chapter two the resulting formation, the Javelina (hav-uh-lena), is characterized by fossils associated with freshwater environments similar to the interior plains of Texas. Sediments and depositional areas of this period began about 74 mya and continued until the great extinction 65 mya. The dinosaurian fauna of the Javelina is not dissimilar from its Aguja counterpart—there were horned ceratopsians, duck-billed hadrosaurs, large sauropods, and large predaceous meat eaters.

The ceratopsian, *Torosaurus utahensis*, is the Javelina tri-horned representative. Incomplete fossil evidence suggest that duck-billed hadrosaurs were represented by something similar to *Edmontosaurus sp.*, a bipedal 3.5 ton plant eater 12 m in length. *Alamosaurus* is the largest of Big Bend's dinosaurs at 25 m in length and weighing 30 tons—a super-sized giant that was a plant eater and represents a significant discovery for the late Cretaceous. Predators of this chapter include specimens very similar to *Tyrannosaurus rex*, the most popular dinosaur of all time.

While Big Bend fossils clearly feature a spectacular dinosaur fauna, not all fossils are dinosaurs. The skies had large flying reptiles such as *Quetzalcoatalus northropi* and the seas were home to mosasaurs, a large marine predator. Dinosaurs were strictly land dwellers and did not live in water.

The end of this tale, the final chapter, is dark and ominous—the Javelina represents the end of the line, the final dinosaur-bearing formation, the end of a great long era, the Cretaceous. The extinction of the dinosaurs and most living things 65 mya was catastrophic, violent, and world changing. Big Bend's geology is missing the pages of this story, its rocks eroded and scattered, an incomplete novel waiting to be finished. And the mystery continues…

Big Bend's Badlands

Volunteer Sharon Collyer

Devoid of vegetation, visible water sources, and discernable wildlife, Big Bend's badlands are often overlooked by park visitors. Found in the lowest park elevations, the bare, multi-colored mounds are perhaps the epitome of what the word "desert" traditionally implies: dusty, sterile, inhospitable, lonely. Ironically, the highly sculpted, sun-baked hills are a tangible reminder of an era when water was plentiful, hardwood forests flourished, and enormous lizard-like creatures ruled the land.

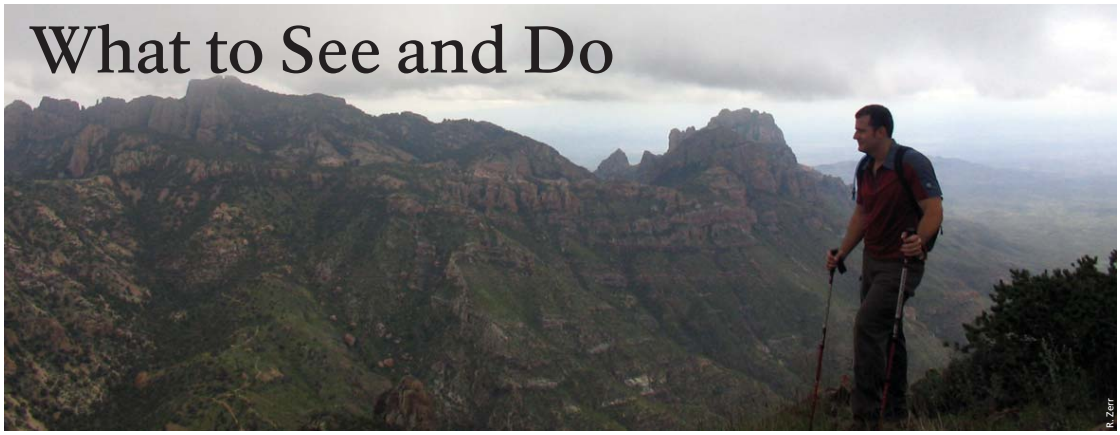
Geologically speaking, badlands are the layered clays, muds and silts that, millions of years ago, formed the beds of ancient seas, rivers and marshlands. The sticky ooze at the bottom of these waterways entombed decaying matter as plants and animals died nearby and got carried into wet areas by floods and scavengers. When the environment became drier and the waterways receded, these layers of material eventually hardened, were overlaid with more material, and then gradually were exposed over the course of geologic history.

Badlands reveal their treasure cache after desert-drenching summer rains and scouring windy winter days. Through the erosive powers of wind and water, vestiges of life long gone are uncovered as the surrounding soils are washed and blown away. To the casual visitor, these stark lumps of clay would be the last place anyone would expect to find traces of early organisms. However, if a person could cut one of the soft mounds open with a giant butter knife, a cornucopia of ancient remains would be exposed. What superficially may seem a bleak, sterile landscape paradoxically holds significant evolutionary secrets and the concrete evidence of prehistoric life.

We hear the word 'barren' used all too often to describe the austere quality of Big Bend's uninviting terrain and denuded landscape. Mysteries contained within layers of primordial clay and hardened mud, however, serve to remind us that life is ephemeral and transitory. Who is to say where the remains of our civilization will be encased, or when they will resurface again…

The badlands on the west side of the park are formed from soft clay hills which yield to erosion while the distant Chisos Mountains, crowned with hard lava flows, resist erosional forces.

What to See and Do



You've driven many miles to get here, and have finally arrived at your destination: Big Bend National Park. But now what? Now that you're here, how do you spend your time? Where should you go? What should you explore? The park is big, and often visitors have a limited amount of time to explore.

One Day

If time allows, drive to the **Chisos Mountains** to take in the spectacular mountain views. Walk the 0.3-mile self-guiding **Window View Trail** to get a feel for the mountain scenery.

A trip along the **Ross Maxwell Scenic Drive** will give you a taste of the Chihuahuan Desert and will lead you to the Rio Grande. There are scenic overlooks and exhibits along the way. Sotol Vista, Mule Ears Overlook and Tuff Canyon are all worthwhile stops. The short walks to the Sam Nail Ranch and Homer Wilson (Blue Creek) Ranch and a visit to the Castolon Historic District will give you a glimpse into Big Bend's past.

A highlight is the short walk into **Santa Elena Canyon**—one of Big Bend's most scenic spots. Travel to the end of the Ross Maxwell Scenic Drive to access the trailhead. You may return to the main road by returning on the Ross Maxwell Drive or on the **Maverick Road**, a 13-mile gravel road linking the Ross Maxwell Drive to the Maverick (west) Entrance. Always check on road conditions first.

Three Days

With three days to spend in the park, you can explore the major roads more thoroughly and still have time for hiking. In the Basin area, consider hiking the **Window Trail** (5 miles round trip) or the **Lost Mine Trail** (4.8 miles round trip); consult the *Hiker's Guide to Trails of Big Bend National Park,* for sale in park visitor centers, for trail descriptions.

In addition to the Basin and Ross Maxwell Scenic Drive (see suggestions for "one day") you can drive to **Rio Grande Village**, perhaps stopping at Dugout Wells along the way to walk the short Chihuahuan Desert Nature Trail. The Rio Grande Village Visitor Center offers a brief introductory slide program. Walk the **Rio Grande Village Nature Trail** which begins near site #18 in the campground. The bluff overlooking the Rio Grande at the end of the nature trail is a particularly beautiful spot at sunset.

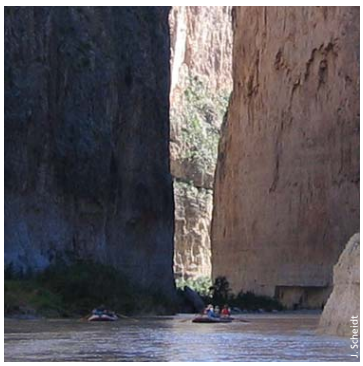
Boquillas Canyon road will take you to several overlooks of the Rio Grande and the small village of Boquillas, Mexico. At the end of the road is the **Boquillas Canyon Trail**, which takes you to the entrance of this spectacular canyon.

One Week

With a week or more to spend in Big Bend, endless possibilities are open to you. You'll have plenty of time to explore the roads mentioned in the previous sections, and will also have time to hike or to drive some of the **"unimproved" dirt roads**. For these, you'll need a high clearance or four-wheel drive vehicle; don't forget to check at visitor centers for current road conditions. The River Road, Glenn Springs Road and Old Ore Road are some of the more popular primitive roads. A visit to Ernst Tinaja near the south end of the Old Ore Road is a Big Bend highlight.

If you don't have high clearance or four-wheel drive, gravel roads such as Dagger Flat, Grapevine Hills and Maverick will get you "off the beaten path." Hike the Chimneys Trail, Mule Ears Trail, or Grapevine Hills Trail for a closer look at the desert environment. If you'd like to explore the Chisos Mountains, trails to Boot Canyon, Emory Peak and the South Rim offer good views of the park and take you into another world which seems far removed from the desert. There are plenty of opportunities for overnight backpacking along these trails. A free backcountry use permit is required and can be obtained at park visitor centers.

Boating in Santa Elena Canyon



Exploring along the Ross Maxwell Scenic Drive

Along the River Road

Floating the Rio Grande

If you have the time and a spirit of adventure, you may want to consider a river trip. Seeing the park's canyons from the middle of the Rio Grande is both fascinating and gratifying. There are many possibilities, from half–day floats to extended seven–day excursions. Park Rangers can recommend a trip that meets your abilities and interests. Rafting and equipment rental companies are listed on page 16.

See "Backcountry Planning" on page 13 for additional information on Big Bend river trips.

Backcountry roads

If you have a high-clearance or four wheel drive vehicle, Big Bend's backcountry roads call for further exploration. There are over 200 miles of dirt roads in the park. Improved dirt roads like the Dagger Flat and Grapevine Hills roads are usually in good condition and accessible to normal passenger vehicles, except following rainstorms. Unimproved dirt roads, such as the Old Ore Road or River Road generally require high-clearance vehicles and/or four wheel drive. Always check current road conditions at a visitor center before traveling and of the park's primitive roads.

Enjoying Your Visit

No matter how limited your time in Big Bend, remember that you will enjoy the park more if you *stop your car and explore on foot*. That doesn't mean that you have to hike miles on steep grades; there are many short, easy walks and roadside exhibits where you can stretch your legs and enjoy the sights, smells and sounds of the Chihuahuan Desert.

Hiker's guides and road guides are available at book sales areas throughout the park, and they offer more detailed information about Big Bend's trails and roads. Attending *ranger-led activities* and *evening programs* are also good ways to learn more about Big Bend; check at the visitor centers and park bulletin boards for current activities.

Remember, you will NOT be able to see everything on this trip. You will probably enjoy the park more if you choose a few spots and explore them thoroughly to get a taste of what Big Bend has to offer. Then, come back again sometime to see the rest!

Take a Hike on Big Bend Trails

Trail	Trailhead Location	Round Trip (mi/km)	(avg. time)	Elevation (ft/m)	Description
Eastside — Panther Junction and Rio Grande Village					
Boquillas Canyon	End of Boquillas Canyon Road	1.4/2.3	1 hour	40/12	**Easy** Begins with a short climb, then descends via a sandy path to the river. Ends near a huge sand "slide."
Chihuahuan Desert Nature Trail	Dugout Wells 6 miles south of Panther Junction	0.5/0.8	1/2 hour	0/0	**Easy** A flat desert path near a cottonwood oasis. Signs interpret Chihuahuan Desert plant life.
Dog Canyon	3.5 miles south of Persimmon Gap	5.0/8.0	2 hours	60/18	**Moderate due to length**. Informal hike to a prominent canyon. Requires some modest route-finding.
Grapevine Hills	Grapevine Hills Road mile 7 Usually passable to all vehicles.	2.2/3.5	1 hour	240/73	**Easy** Follows a sandy wash through boulder field. A short climb at the end takes you to a large balanced rock.
Hot Springs	End of Hot Springs Road. Unpaved and narrow road.	0.75/1.2	1/2 hour	0/0	**Easy** Walk past historic buildings to the riverside hot springs. 105°F water. *Take a bathing suit and soak a while.*
Rio Grande Village Nature Trail	Rio Grande Village Campground Opposite campsite 18	0.75/1.2	1/2 hour	130/40	**Easy** Cross a boardwalk to a great view of the river and distant mountains. Good birding and sunrise/sunset views.
The Chisos Mountains					
Basin Loop	Chisos Basin Trailhead (near the Basin Store)	1.6/2.6	1 hour	350/107	**Moderate** Connects the Laguna Meadow and Pinnacles Trails. Nice views of the Basin area.
Window View	Chisos Basin Trailhead (near the Basin Store)	0.3/0.5	1/4 hour	0/0	**Easy** Level, paved, handicapped accessible. Great mountain views. The best place in the Basin to catch sunset through the Window.
Lost Mine	Basin Road mile 5 (at Panther Pass)	4.8/7.7	3 hours	1100/335	**Moderate but steep** This trail provides excellent mountain and desert views. Go halfway for a shorter hike.
The Window	Chisos Basin Trailhead or Basin Campground	5.6/9.0 4.4/7.0	4 hours 3 hours	980/299 500/152	**Moderate with steep return** Descends to the top of the Window pouroff. Great scenery and wildlife viewing. For a shorter hike, start at the Basin campground. **Note:** Smoking is prohibited on the Window Trail.
Westside — Ross Maxwell Scenic Drive					
Blue Creek Ranch	Ross Maxwell Drive mile 8	0.5/0.8	1/2 hour	90/27	**Easy** Descends from overlook via old road to 1930s ranch buildings; connects with Blue Creek Canyon & Dodson trails.
Castolon Historic District	Castolon Historic District Ross Maxwell Drive mile 22	0.5/0.8	1/2 hour	20/6	**Easy** A short, self-guided walk highlighting the unique history of this border community.
Lower Burro Mesa Pouroff	Ross Maxwell Drive mile 11	1.0/1.6	1/2 hour	60/18	**Easy** A flat, sandy trail up a canyon to the base of a dry pouroff. Interesting geology and desert plants.
Sam Nail Ranch	Ross Maxwell Drive mile 3	0.5/0.8	1/4 hour	0/0	**Easy** A loop walk through the remains of a fairly typical 1930s Big Bend area ranch.
Santa Elena Canyon	8 miles west of Castolon	1.6/2.6	1/2 hour	80/24	**Easy** Crosses creekbed, climbs stairs, then follows the river upstream into the mouth of the canyon. Flash flooding on Terlingua Creek can close this trail.
Tuff Canyon	Ross Maxwell Drive mile 19	0.75/1.2	1 hour	70/21	**Easy** Balconies overlook this scenic canyon. A short trail leads into and through the canyon itself.
The Chimneys	Ross Maxwell Drive mile 13	4.8/7.7	2 hours	400/122	**Moderate due to length**. Flat desert trail to prominent rock formations. Look for rock art. No shade.
Upper Burro Mesa Pouroff	Ross Maxwell Drive mile 6	3.6/5.8	3 hours	525/160	**Moderate** Requires some modest route-finding through washes and narrow gorges to top of the pouroff.
Mule Ears Spring	Ross Maxwell Drive mile 15	3.8/6.1	3 hours	20/6	**Moderate** A beautiful desert hike to a small spring. Spectacular geology and mountain/desert views.

Looking for more hikes? *The Hiker's Guide to the Trails of Big Bend National Park* ($1.95) contains detailed listings of longer duration hikes and additional trails throughout the park and is available at all visitor center bookstores. Additional guides describing the paved and backcountry roads are also available.

= Self-guiding trail = Handicapped accessible trail

Hiking at the Red Rocks.

Featured Hike

Red Rocks

Distance: 2 mile (3.2 km) round trip
Elevation: Minimal gain of 200' (61 meters)

Welcome to Big Bend! You have hiked Santa Elena, tried your luck with the Lost Mine Trail, and conquered Emory Peak. Now what? Have you ever heard of the Red Rocks? Chances are that you haven't, reason being it is not listed on any map. You can access this short walk from the Homer Wilson/Blue Creek Ranch parking area off the Ross Maxwell Scenic Drive. From the parking area you will descend to the base of Blue Creek Canyon about a quarter of a mile, where the Dodson and Blue Creek trails meet near the still standing ranch foreman's house. This was the operations hub for the Homer Wilson ranch, possibly the largest goat-ranching operation in this part of west Texas.

Turn northeast on the Blue Creek trail after looking around the ranch foreman's house. You will wander up this gravelly creek bed for a mile before arriving at the Red Rocks. The huge red pinnacles welcome you into the magnificent Blue Creek Canyon. These rocks are spread over the next three quarters of a mile through the canyon and provide plenty of shady places to sit and ponder why they called it Blue Creek.

Some visitors wander further up the trail, though most are content with the first couple of miles. As it nears the steeper slopes of the Chisos the trail becomes more strenuous, climbing up switchbacks and eventually dropping into Laguna Meadow.

For Your Safety While Hiking

- Wear hiking boots with good traction.
- Carry plenty of water, drink a gallon a day.
- Wide-brimmed hats or sunscreen are necessary precautions againt the desert sun.
- If you encounter a mountain lion or bear, DO NOT RUN! Yell, scream, wave your arms, throw rocks or sticks, and look big.
- Do not allow children to run ahead or get separated from the group.
- Elevations in the Chisos Mountains reach over 7800 feet (2377 meters). If you are not accustomed to high altitudes, even mild exertion may leave you feeling light-headed and nauseated.

The Night Skies

Ranger Mary Kay Manning

Winter begins with Mars almost directly overhead in the dim constellation Aries and Saturn rising in the east in the faint constellation Cancer. There are no bright stars near either area, so these two planets should be fairly easy to pick out. By the end of February, Mars will move lower into the western sky and Saturn will be almost overhead. Those who arise before dawn will see Jupiter shining in the southeast throughout the winter.

Cold winter nights provide perfect stargazing conditions, particularly in Big Bend. Since cold air holds very little moisture, starlight appears more crisp and clear than on humid summer nights. Our trajectory has us facing the denser part of the Milky Way galaxy at this time of year, so we see more stars – and more bright stars – than on summer nights, when we face a sparser region of our galaxy. The prevailing north winds this time of year also assist stargazers here. There are few pollution sources to our north, so cold fronts tend to clean the air over Big Bend by blowing away airborne debris.

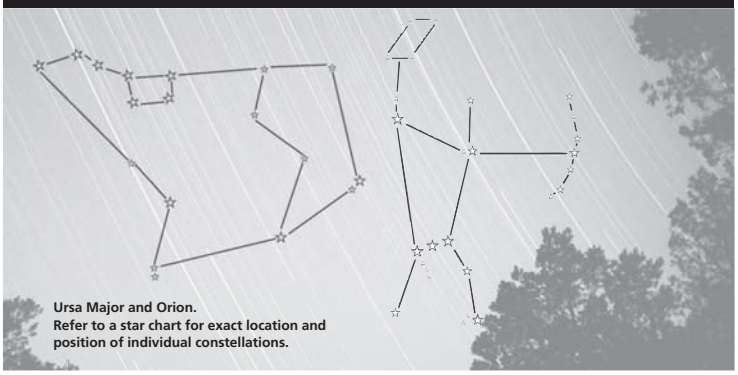
Some of the brightest and easily recognizable constellations decorate the sky on winter nights. Orion is the most prominent figure, rising in the east in December. Look for the reddish star Betelgeuse in his right shoulder and blue-white Rigel at his left knee. The most distinctive feature of Orion, the three stars in his belt, points toward the upper right to red Aldebaran and the small brilliant star cluster of the Pleiades, both part of Taurus the Bull. The belt stars point to the lower left at Sirius, the brightest star in the night sky. Sirius is in the constellation Canis Major, the Big Dog; on a clear night you can trace his entire body.

Vying with Orion for brightness is the pattern of the Big Dipper, rising in the northern sky. Not a true constellation on its own, the Big Dipper is actually part of the larger figure Ursa Major, the Big Bear. Draw a line from the pointer stars at the end of the dipper toward the west to find Polaris, the North Star. From our perspective, Polaris seems to remain fixed in place above our north pole. Because of this, people have used it for navigation for thousands of years. Drawing the line from the Big Dipper's pointers in the opposite direction leads to Regulus, the brightest star in Leo the Lion. He begins to stalk the night sky shortly after sunset in January.

Yet another bright winter sky pattern is the Great Square of Pegasus. It sits high in the western sky in December and drops toward the west as the months go by. Like the Big Dipper, this figure is not a true constellation; parts of both Andromeda and Pegasus share the square. Picking out the image of a flying horse requires a star chart and a good imagination. Star gazers who make the effort to trace Andromeda will be rewarded with seeing the little cloud of the Andromeda Galaxy, 2.2 million light-years away.

Happy star gazing!

Constellations of the Winter



Ursa Major and Orion.
Refer to a star chart for exact location and position of individual constellations.

Birds and Birdwatching

Ranger Mark Flippo

Welcome to Big Bend National Park and the challenges of winter season bird watching. Of the nearly 450 species reported in the park, almost a third of them occur here during the winter months. Many of these are waterfowl and sparrows; the former along the Rio Grande, the latter haunting grassy areas in the lower and mid-elevation desert. The challenge of identifying winter plumage ducks and sparrows is huge, but not to worry. There are other birds out there to lend diversity to your list.

Easily found permanent residents of the park, many of them unique to the desert southwest, include greater roadrunner, cactus wren, and black-throated sparrow. These are joined by species that spend only the winter in Big Bend, migrating here from breeding grounds farther north, including ruby-crowned kinglet, orange-crowned warbler, and green-tailed towhee. Mild weather may even encourage some migrants to linger here, as was the case with black-throated gray warblers last year. To tempt the avid birder, there is always the possibility of discovering a rare, out-of-range species. During the annual Chisos Circle Christmas Count in December of 2004, two observant birders found a clay-colored robin at Sam Nail Ranch, providing a first record for the park.

Patience, a good field guide, and knowledge of where to look are the keys to locating the birds of Big Bend. First and foremost are the riparian areas, including the corridor of the Rio Grande (Rio Grande Village and Cottonwood campgrounds), and the many desert springs (Dugout Wells and Sam Nail Ranch). Other productive areas include the pinyon-juniper-oak belt (Green Gulch and lower Lost Mine trail), the moist, wooded canyons of the high Chisos (Boot Canyon), the grassland/ shrub community along the lower slopes of the Chisos (Blue Creek Canyon), and the remaining lower desert areas. A checklist of birds is available for purchase at any visitor center and is a great aid in determining which species are likely to be present and the habitats where they are found. A visit to all these key habitats will provide the best opportunities to see birds and to build that "Big Bend List."

While "listing" is a legitimate and fun activity, keep in mind that many of the species that are the source of your enjoyment are members of populations in decline. Habitat destruction and degradation on both the wintering and breeding grounds are bringing many of these birds to the brink. You can help in several ways. Come join us in the *annual Christmas Bird Counts* held December 28 and 29 (ask at a visitor center for details). Tread softly in fragile habitat areas, taking care not to damage water sources. Don't disturb birds with excessive noise or intrusive attempts at photography. Please share your observations with us, particularly of rare and accidental species. Your detailed reports becomes part of the record and can be an aid to researchers. Enjoy the birds of winter, and do all that you can to ensure their return.

Green-tailed towhee

Green-winged teal

Be a Friend to Big Bend

Founded in 1996, the Friends of Big Bend National Park is a private not-for-profit organization with a mission to support, promote, and raise funds for Big Bend National Park in partnership with the National Park Service and other supporters who value the unique qualities of this national resource on the Rio Grande. The Friends of Big Bend National Park has funded a range of critical projects, including wildlife research programs, the purchase of equipment to monitor air and water quality, and the construction and renovation of Park infrastructure.

FRIENDS of BIG BEND NATIONAL PARK

PO Box 200
Big Bend NP, TX 79834

www.bigbendfriends.org
432-477-2242

Get In On the $30-Per-Plate Fund Raiser

Big Bend custom plate are now available for your car, truck or motorcycle from the state of Texas and most of the cost will be used to help preserve and protect Big Bend National Park, one of the world's last great wildernesses. It may be the most fulfilling contribution you'll ever make.

Keeping Wildlife Wild

Do Not Feed the Animals.
Not even once. It's bad for them, they can hurt you, and it's against the law. Don't touch, don't feed.

Left: **It's no laughing matter. Javelina that become habituated to human food become more aggressive. Several visitors are bitten by javelinas each year.**

S. Verschoyle

There really are no problem animals — only problem people. Carelessness can kill. Don't be responsible for the death of a wild animal. Your actions affect both Big Bend's wildlife and future park visitors. With your help, wildlife and humans CAN live safely together in Big Bend National Park.

Mountain Lions

If Big Bend National Park has a symbol, it might well be the mountain lion. Solitary and secretive, this mighty creature is Big Bend's top predator, and is vital in maintaining the park's biological diversity. Everywhere you go in Big Bend, you are in the territory of at least one lion. From mountain to desert, biologists estimate that the park has a stable population of approximately two dozen lions. Within the delicate habitats of the Chihuahuan Desert, mountain lions help balance herbivores (animals that eat plants) and vegetation. Research shows that these large predators help keep deer and javelina within the limits of their food resources. Without lions, the complex network of life in Big Bend would certainly be changed.

Since the 1950s, there have been more than 2,700 recorded sightings of mountain lions by the visiting public within Big Bend National Park. While 90% of sightings are along park roads, observations of lions on park trails also occur. While over 90 percent of these sightings were along park roadways, encounters along trails have also occurred. Since 1985, three lion and human encounters have resulted in attacks on people. In all cases, those attacked recovered from their injuries and the aggressive lions were killed. The more we know about lions, the better able we will be to make life easier for them and for us.

A free informational brochure about mountain lions is available at all visitor centers.

Javelinas

For many visitors to Big Bend National Park, seeing a javelina (hav-uh-LEE-nuh) is a new experience. These curious creatures, also known as collared peccaries, are only found in the United States in Texas, New Mexico, and Arizona. They are covered with black, bristly hairs and generally weigh between 40 and 60 pounds. They usually travel in groups called bands that consist of 10-25 individuals. Peccaries have a highly developed sense of smell, but very poor vision.

Physically, javelinas resemble pigs, but in reality, they are not closely related to pigs at all and have been genetically distinct from them for millions of years.

A javelina's diet includes prickly pear cactus, grasses, mesquite beans, pinyon pine nuts, fruits, berries, and seeds. Unfortunately however, many javelinas now include human food as part of their diet. Every year we are seeing more and more campsites in the park raided by javelina. Although normally not aggressive, they can be when food is involved. Protect yourselves and the javelina by properly storing all your food inside a vehicle or in the food storage lockers provided in the campgrounds. Do not leave coolers or food boxes unattended on picnic tables or in a tent. Flatten tents when you are away from your campsite. It is important that javelinas and all park animals eat their natural food sources to stay healthy and safe. With your help, these unique animals can continue to thrive and thrill park visitors for years to come.

Black Bears

The return of black bears to Big Bend National Park is a success story for both the bears and the park. Native to the Chisos Mountains, bears disappeared from this area during the pre-park settlement era. After an absence of several decades, bears began returning to the park from Mexico in the early 1990s. Today, wildlife biologists estimate that between 12-15 black bears may live in the park.

Black bears are omnivorous; their normal diet is comprised of large amounts of nuts, fruits, sotol and yucca hearts, and smaller quantities of small mammals, reptiles, and carrion.

Bears normally avoid humans, but bears that learn to get food from human sources often become aggressive in their attempts to get more "people" food. Rangers may have to kill bears that lose their fear of people and endanger humans in their attempts to get our food.

Big Bend has made it easy to keep edible items away from bears. Campers at the Chisos Basin Campground, at High Chisos backpacking sites, and at some primitive roadside campsites will find bearproof storage lockers for storing all edibles. Hard-sided vehicles are also suitable for storing edible items. All dumpsters throughout the park are bear-proof, as well.

A free informational brochure about black bears is available at all visitor centers.

Please Help

In Developed Campgrounds
- Store food, beverages, trash, toiletries, pet food, and dishes in the bearproof storage locker provided at your site.
- Keep your campsite clean. Take trash and food scraps to a dumpster.
- Dump liquids in restroom utility sinks, not on the ground.
- Ice chests and coolers are not bear-proof; store them in your vehicle.

Cyclists
- Use food storage lockers when provided.

At the Lodge
- Leave nothing outside your room, on the balcony, or on the porch.

In the Backcountry
- Never leave packs or food unattended.
- Avoid carrying odorous food and toiletries.
- Leave excess food and beverages in your trunk or food storage box.
- Carry out all trash, including orange peels, cigarette butts, and left-over food.
- Ice chests and coolers are not bear-proof; store them in your vehicle.

If you encounter a bear or mountain lion:

- Do not run (you may resemble prey).
- Watch children closely and never let them run ahead or lag behind.
- Try to look large. Wave your arms. Throw rocks or sticks at it.
- If attacked, fight back.
- Report any bear or mountain lion sightings or encounters to a park ranger as soon as possible.

Information and Services

Ranger Programs
Join a park ranger for a guided hike, evening slide show, talk, or workshop on Big Bend's natural and cultural history. These free programs are offered daily. Consult the Interpretive Activities Schedule posted on visitor center and campground bulletin boards for more information.

Camper Stores
Forever Resorts Inc., operates camper stores year-round at three locations in the park: Castolon, the Chisos Basin, and Rio Grande Village. Groceries, camping supplies and souvenirs are available in all locations. The gas station at Panther Junction also has a limited selection of groceries.

Banking
There are NO banking facilities in Big Bend National Park. The nearest banking/ATM services are located in Study Butte, 26 miles west of park headquarters. Most stores accept major credit cards; however, some local services accept only cash. It is advisable to have small bills ($1, $5, $10, $20) since larger bills are often difficult to change.

Lodging
The Chisos Mountains Lodge, operated by Forever Resorts Inc., is located in the Chisos Basin at 5,400 feet elevation. The lodge offers 72 rooms, plus a gift shop and dining room. For reservations or more information, please call (432) 477-2291 or visit their website at www.chisosmountainslodge.com

Gas Stations
Gasoline is available at two locations in the park operated by Forever Resorts Inc. The Panther Junction station offers 24-hour gas pumps with diesel, and can undertake minor repairs. The gas station at Rio Grande Village also provides propane.

Post Office
A full-service Post Office is located at the Panther Junction headquarters, across the porch from the visitor center entrance. A mail drop is also available in front of the Chisos Basin store.

Showers and Laundry
Public showers and laundry facilities are located at the Rio Grande Village store.

Fires
Ground fires and wood fires are prohibited throughout the park. Use only gas stoves or charcoal within a BBQ grill. Pack out all evidence of use, including ash. In the backcountry, charcoal fires are only allowed at roadside campsites and are prohibited in the High Chisos or zone camping areas.

Public Phones / Cell Phones
Public phones are located at visitor centers, campgrounds, camper stores, and the Chisos Mountains Lodge.
Limited cell phone coverage is available in the Big Bend area. Do not depend on your phone to work in the Chisos Basin or remote portions of the park.

Recycling
Please use the recycling cans provided in campgrounds, around stores, and near visitor centers. On average, the park recycles around 100,000 pounds of aluminum, cardboard, glass, plastic, metal and other materials each year. Every pound of material that can be recycled means one less pound buried in the park landfill. Please recycle!

Accessibilty
All visitor centers are accessible. Wheelchair-accessible campsites and restrooms are located in the Chisos Basin and Rio Grande Village Campgrounds. The Chisos Mountains Lodge restaurant is accessible, as are some motel rooms. A Telecommunications Device for the Deaf is available at park headquarters. Employees with sign language abilities may be available. Some ranger-led programs are also accessible. The Window View Trail is paved and fairly level. A brochure on accessibility is available at all visitor centers.

All trails start here! The Chisos Basin trailhead is located just past the camper store in the Basin.

Camping

Trailers & RVs
All park campgrounds can accommodate trailers and RVs, but vehicle lengths have a great deal to do with safely reaching the campground and finding a suitable space.

The only hookups available in Big Bend National Park are at Rio Grande Village in the 25-site, Rio Grande Village RV Park operated by Forever Resorts Inc. Although there is no size restriction, your vehicle must be equipped with water and electrical hookups as well as a three-inch sewer connection. Register at the store. No advance reservations.

Near the RV park is the 100-site Rio Grande Village Campground operated by the National Park Service. Although there are no hookups, water, flush toilets, and a dump station are available. Set in a large grove of cottonwoods, the campground is adjacent to the Rio Grande. Many of the sites are pull-throughs. Generator use is limited: from 8:00 am to 8:00 pm daily. A no-generator use area is also designated.

The 60-site Chisos Basin Campground is rugged and hilly. The sites are small and most are not suited to recreational vehicles or trailers. The road to the Basin is steep and curvy, especially at Panther Pass—the road's highest point. The road into the campground is a 15 percent grade. Trailers longer than 20 feet and RVs longer than 24 feet are not recommended.

Cottonwood Campground, near Castolon, offers pit toilets and potable water, but no hookups or dump station. *Cottonwood is a NO-generator campground.*

Big Bend's unpaved roads are generally unsuitable for RVs and trailers. Overnight camping in any primitive site requires a backcountry permit, which can be obtained in person at park visitor centers up to 24 hours in advance.

Mark Doiron

Chisos Basin Campground

Tent Camping
The National Park Service operates campgrounds at Rio Grande Village, the Chisos Basin, and Castolon. The cost is $10.00 per night for a site. Campsite fees can be paid in US currency, personal checks, or credit card.

Camping is also available at primitive backcountry campsites in the Chisos Mountains and along backcountry roads. High-clearance or 4-wheel drive vehicles are necessary to reach most road sites. Backcountry permits are required and can be obtained in person at park visitor centers up to 24 hours in advance.

Camping areas are often full during the Thanksgiving and Christmas holidays, as well as during spring break in March or April.

Campsite Reservations
Forty-three (43) sites at Rio Grande Village campground and twenty-six (26) sites at the Chisos Basin campground are reservable from November 15 to April 15 each year. Visitors may contact ReserveUSA year round to make reservations for the period of November 15 through April 15 of each year. All remaining campsites in these two campgrounds and the entire Cottonwood campground remain on the first-come first-serve basis.

Campsite reservations may be made on-line at www.reserveusa.com, or by calling 1-877-444-6777.

Group Camping
Groups of 10 or more are eligible to reserve a spot in one of the park's Group campsites at the Rio Grande Village, Chisos Basin, and Cottonwood Campgrounds. Group sites are reservable year round and reservations may be made 360 days in advance. Reservations for Rio Grande Village and the Chisos Basin campgrounds family-type sites may be made 240 days in advance through ReserveUSA.

Developed Campgrounds at a Glance

	Elevation (ft/meters)	Sites	Nightly Fee	Facilities	Registration	Comments
Chisos Basin	5,401 / 1,646	60	$10.00*	Flush toilets, dump station	Self-pay station	Surrounded by rocky cliffs; many hiking trails nearby
Cottonwood	2,169 / 661	31	$10.00*	Pit toilets, *no generator use allowed*	Self-pay station	In a cottonwood grove along the river. Grassy sites. Good birding.
Rio Grande Village	1,850 / 564	100	$10.00*	Flush toilets, dump station	Self-pay station	Largest campground; shady sites. Laundromat and showers nearby.
Rio Grande Village RV	1,850 / 564	25	$21.00 and up	Full hookups	RGV Camper Store	Concession-operated; adjacent to the RGV store.

* $5.00 with Golden Age or Golden Access Passport

Backcountry Planning

Getting a Permit

A free permit is required for all river use, horse use, and overnight backcountry camping, and can be obtained in person only up to 24 hours in advance of the trip. Permits can can be written for as many as fourteen (14) consecutive nights in the backcountry. Park staff can assist you with trip planning based on your needs and current trail conditions. Permits can be obtained at all visitor centers during normal operating hours.

Backcountry sites throughout the park are difficult to obtain during the Thanksgiving and Christmas holidays, and during spring break in March and early April.

Plan Ahead

Detailed information on backcountry campsites in the Chisos Mountains and along the backcountry roads are available on the park's website at www.nps.gov/bibe

A wide variety of maps, books, hiking guides and river guides are available for purchase at park visitor centers. If you would like to order them in advance of your trip, call the Big Bend Natural History Association at 432-477-2236 or visit their online internet bookstore at www.bigbendbookstore.org

Backcountry Water

The dry desert air quickly uses up the body's water reserves. Each hiker should carry and drink a minimum of one gallon of water for each day they are in the backcountry. Spigots for drinking water are available at all visitor centers.

Big Bend is a desert environment. Springs and tinajas (depressions in rock where water collects) are rare and often unreliable and should be filtered. Every gallon removed from backcountry water sources is one less for the wildlife which depend on them. Please carry enough water to supply your own needs — don't risk your life by depending on desert springs. Caching water is recommended for extended hiking trips in the desert.

Hiking & Backpacking

Big Bend National Park offers over 100 miles of hiking trails in the Chisos Mountains and desert terrain. A free permit is required for all overnight trips in the backcountry. Decide how much distance you want to cover and how much time you have. Desert hiking can be unpleasant or deadly in hotter months.

In the Chisos Mountains, the Southeast Rim Trail and a portion of the Northeast Rim Trail from the Boot Canyon/Southeast Rim junction are closed during the peregrine falcon nesting season (February 1 - May 31).

Zone camping permits are available for backpackers who wish to camp outside of the Chisos Mountains. The park is divided into a number of zones ranging from areas along popular trails to extremely isolated areas.

Horses

Visitors are welcome to bring and use their horses in the park. A free stock-use permit is required and may be obtained in person at any of the park's visitor centers up to 24 hours in advance of the trip. Every horse user should obtain a copy of the regulations regarding use of horses in the park.

While horses are not permitted on paved roads or road shoulders, all gravel roads are open to horses. Cross-country travel is permitted in the park, except in the Chisos Mountains where horse use is limited to the Laguna Meadow, Southwest Rim, and Blue Creek trails. Horses are not permitted in picnic areas, on nature trails, the Santa Elena and Boquillas Canyon Trails, or the Pine Canyon Trail. The Chisos Mountain and Burro Mesa trails are day-use only.

Grazing within the park is not permitted, so you must bring your own feed. Stock may be watered in the Rio Grande and at springs that are not used for domestic water supply. Be prepared to haul water for your stock as springs are unreliable, especially during winter months. Check current spring conditions at a visitor center when you arrive. All horse manure and feed remnants must be removed from the park, or deposited at a designated location near the NPS horse corral at Panther Junction (ask a ranger for directions).

You may camp with your horses at many of the park's primitive road campsites. The Government Springs campsite, located 3½ miles west of Panther Junction, is a primitive campsite with a corral large enough for 6 horses. If you plan to bring horses to the park, you may reserve this campsite up to 10 weeks in advance by calling 432-477-1158.

Backcountry Roads

For those who wish to camp in the backcountry without having to backpack, Big Bend offers over seventy primitive campsites along backcountry roads. Most sites are located in the desert and along the River Road. There are no primitive roadside campsites in the Chisos Mountains. While some sites are accessible to most vehicles, a high clearance and/or four wheel drive vehicle is necessary to reach others. Other than a nice view, isolation, and a flat gravel space, these sites offer no amenities and no shade. There is no charge to use these sites, but a backcountry permit is required.

Floating the Rio Grande

The Rio Grande follows the southern boundary of Big Bend National Park for 118 miles. In this distance it has carved three major canyons, Santa Elena, Mariscal, and Boquillas, which have rapids varying in difficulty from Class I to Class IV. Between the canyons, the river is generally slower-paced. The Rio Grande Wild and Scenic River extends downstream beyond the park boundary for an additional 127 miles.

If you plan to take a river trip in Big Bend National Park, you may bring your own equipment, or you can hire a guide service. Four local companies (see page 16 for telephone listings) provide guide service in the park—you may reserve a trip by contacting them directly.

If you plan to use your own equipment, you must obtain a free permit at a park visitor center. Stop by the Panther Junction Visitor Center for your permit and for current river condition information prior to your trip.

Permits for the Lower Canyons of the Rio Grande Wild and Scenic River may be obtained at the Persimmon Gap Visitor Center (a self-permitting station is available for after-hours use). Permits for floating Santa Elena Canyon may be obtained at the Barton Warnock Center in Lajitas. However, we encourage all parties to get their permits at a park visitor center when possible, to obtain the most up-to-date river information and conditions.

Top: **A comfortable campsite in the lower canyons of the Rio Grande.**

Bottom: **Camping along the backcountry roads.**

Leave No Trace in Big Bend National Park

Plan ahead and prepare
Big Bend is a land of extremes. Plan on high desert temperatures in the summer with little to no shade; in the winter freezing temperatures are possible in the Chisos Mountains. Schedule your visit to avoid peak season. Visit in small groups. Split larger parties into groups of 4-6. Use a map and compass to eliminate the use of marking paint, rock cairns or flagging.

Travel and Camp on Durable Surfaces
Durable surfaces include established trails and campsites, rock, and gravel. Protect riparian areas by camping at least 100 yards from springs, creek beds, and tinajas. Good campsites are found, not made. While on the trail, walk in single file in the middle of the trail, even when wet or muddy. Keep campsites small. Focus on areas where vegetation is absent.

Dispose of Waste Properly
Pack it in, pack it out. Inspect your campsite and rest areas for trash or spilled foods. Pack out all trash, leftover food, and litter. Deposit solid human waste in cat-holes dug 6 to 8 inches deep at least 1/4 mile from water, camp, and trails. Cover and disguise the cathole when finished. *Pack out toilet paper and hygiene products.*

Leave What You Find
Preserve the past. Examine, but do not touch, cultural or historic structures and artifacts. Leave rocks, wildflowers and other natural objects as you find them. Avoid introducing or transporting non-native species. Do not build structures, furniture, or dig trenches.

Minimize Campfire Impacts
Campfires are not allowed in Big Bend National Park. In order to cook foods you may use a backpacking stove, portable fuel stove or the barbeque grills in your campsite.

Respect Wildlife
Observe Big Bend's wildlife from a distance. Do not follow or approach them. Never feed wild animals. Feeding wild animals damages their health, alters natural behaviors, and exposes them to predators and other dangers. Protect wildlife and your food by storing rations and trash securely. Pets are not allowed in the backcountry or on trails. Pets should be on leash and under supervision at all times.

Be Considerate of Other Visitors
Respect other visitors and protect the quality of their experience. Be courteous. Yield to other users on the trail. Step to the downhill side of the trail when encountering pack stock. Take breaks and camp away from trails and other visitors. Let nature's sound prevail. Avoid loud voices and noises.

Pets in the Park

What Not to Do

"I led a bird walk at Rio Grande Village this morning. A woman asked if she and her dog could join our hike. When I told her that she was welcome but the dog was not, she tied the poodle to a picnic table and joined the group. After the hike, as we approached the woman's campsite, instead of finding 'Fifi' yapping away at us, we discovered only its remains. A javelina was just completing a poodle-dinner."

- Ro Wauer
Chief Naturalist, 1970

Pets in a Wilderness Park

Having a pet with you will limit your activities and explorations in the park. In addition, desert temperatures and predators are a serious threat to your pet's well being. Please keep in mind the following points when bringing a pet to to the park:

• A National Park is a refuge for the animals and plants living within it. Even if your pet doesn't chase animals, dogs present the image and scent of a historical predator. The result is stress on native wildlife.

• Keep your pet on a leash no longer than six feet in length (or in a cage) at all times. Pets are not allowed on park trails, or anywhere off established roadways. Pets may not be left unattended in the park.

• *Predators such as owls, coyotes, javelina, and mountain lions CAN and DO kill pets here*. Even large dogs cannot defend themselves against such predators.

Remember, desert heat is *deadly*. Do NOT leave your pet alone in a vehicle. Pets are not allowed on trails, off roads, or on the river.

Pets are not allowed on trails or in backcountry areas.

The following kennel and veterinary services operate in the greater Big Bend area:

Terlingua Creek Kennels (Oct-April)
Terlingua, TX
(432) 371-2348

Red Woof Inn of the Big Bend
Alpine, Texas
(432) 837-7475

Alpine Veterinary Clinic
Alpine, Texas
(432) 837-3888

Big Bend is for Kids

Explore!

Big Bend's habitats range from the Chihuahuan Desert to the Rio Grande to the Chisos Mountains, and all are rich with plants, animals, and stories of human history, giving children plenty of opportunity to explore.

Kids visiting the park enjoy the exhibits and relief map of the park at the Panther Junction
Visitor Center, the Fossil Bone Exhibit area, the Hot Springs, the sand dune in Boquillas Canyon, the mountain lion exhibit at the Chisos Basin Visitor Center, and the hands-on exhibits at the Castolon Visitor Center.

Get kids involved in ranger-led programs. These include guided hikes, slide programs, bird walks, and explorations of various park features. Check the schedule at any visitor center to make sure you take advantage of all the available programs. Stop by any visitor center for further suggestions.

Hike a Trail!

Many park trails are suitable for families. Consult the listing of Easy and Moderate Hikes on page 9. For children in strollers, consider the Window View Trail, a paved ¼-mile loop trail that begins at the Chisos Basin trailhead. Remember to watch children closely and never let them run ahead or lag behind.

Become a Junior Ranger!

Learn desert secrets, identify the parts of a cactus, and discover what javelina eat! The Big Bend Junior Ranger program is designed for kids of all ages. Through activities, games, and puzzles, kids can have fun as they learn about the park. They can also earn a badge or patch, a bookmark, and a certificate.

The Junior Ranger Activity Book costs $2.00 and is available at all park visitor centers.

***Right*: Many ranger-guided walks and programs are kid-friendly!**

The Story of the "Leaverite"

Ranger Dan Leavitt

A typical summer day passes slowly in the visitor center when a young man enters the visitor center and yells, "That's it! Right there!" He points to the giant silhouette of a *Quetzalcoatlus*, a large pterodactyl displayed on the floor of the visitor center. His brother approaches exclaiming, "Whoa! That's much bigger than the one that we saw."

Shocked, I wonder where these boys saw a pterodactyl. I've been here for more than three years, and have never seen one. Maybe they saw it on the DVD player attached to the back of the car seat, or in a brochure they picked up in a museum. I ask, "Where did you see a pterodactyl?"

They explained that while hiking with their father they had stopped for a rest and wandered into a cave, one that is right off a busy trail. While in the cave the boys claimed to have found the fossilized remains of a large flying reptile. One of them even contorts his body to demonstrate the exact way the creature's remains were positioned in the cave. For further evidence one the boys hands me a small piece of the supposed beast, a rock fragment, mostly white, but too small to tell its origin. They had stripped it from the fossil, and now asked if I could verify its origins. And so begins yet another story involving the *leaverites* of Big Bend National Park.

I remember the first time a visitor showed me a leaverite. I was fresh out of college and had no idea how to identify one. A visitor walked up to the Panther Junction information desk with four pounds of black stone in his hands. He asked, "What kind of rock is this?" As I stumbled for words, my coworker stepped up and responded, "Looks like a leaverite to me!"

"What kind of rock is a leaverite?" the man asked. Having never heard of this before, I too was wondering. "It's the kind that when you see it, you leave 'er right where you found 'er." In a few words and with a bit of humor she was able to say what I wanted to, but was unable to voice.

Leaverites are all resources, big and small, in all of our national parks, and are protected from poaching and collecting. They come in all shapes, sizes, colors, and a variety of textures, smells, and tastes. Whether it's a pterodactyl or just a rock that you do not think of as significant, please leave it right where you found it. If you need a memento, take a photograph or make a drawing, but please do not take pieces of Big Bend National Park home or into a visitor center for identification. My mother used to remind me as a child; "If everyone were to walk out of this place with a rock, there wouldn't be anything worth looking at anymore!"

If you do happen upon a fossil or archaeological site, we have specific forms that you can complete to describe the area and what you saw. Remember, it is unlawful to transport natural resources and cultural artifacts through the park if there is no proof of their purchase. So a word to the wise; unless you have a receipt you are liable for illegal possession of natural resources and cultural resources in a national park. In March of 1999, a man was fined $600 dollars for possessing archeological and geological resources.

Those two boys had collected a piece of rock, brought it miles from its original location, and handed it to us for identification. What they were unable to provide was a descriptive location, which is of much more importance than handing in a small piece of rock that no longer holds significance. They may have found an amazing creature but, because of the lack of positional information, we may never know exactly what they saw.

While wandering around the park remember your fellow park stewards. Do them a favor if you find something of interest; leave 'er right where you found 'er and let a ranger know if it is significant. In this way, generations of interested park visitors can enjoy Big Bend's resources just as you have. Remember what mom told you and remember the leaverites.

Safety is Your Responsibility

Big Bend is unfamiliar country to most visitors yet it need not be dangerous. Whether hiking the highcountry, rafting the Rio Grande, observing wildlife, or simply driving the scenic roads of this wilderness park, let safety be your constant companion. Spend a moment reviewing these common safety concerns so that you may have an enjoyable visit.

Big Bend is wild country. In fact, many people visit precisely because it is so remote and rugged. But remember, as you enjoy the splendor of this great wilderness area, to make safety a priority. By giving forethought to your actions you can have a safe, exciting, and rewarding experience in Big Bend National Park.

Driving

Of the few accidental deaths in Big Bend that occur each year, most result from car accidents. Drive within the speed limit, 45 mph maximum in the park, and watch for javelina, deer, and rabbits grazing along road shoulders, especially at night. Federal regulations require that ALL occupants of a vehicle wear seats belts while in a national park. Remember, too, that you share the road with bicyclists and pedestrians. Some park roads, such as the road into the Chisos Basin, are steep and winding and require extra caution. The Basin Road is not recommended for RVs over 24 feet or trailers over 20 feet. Finally, always select a designated driver before drinking alcoholic beverages.

Poisonous Animals

Venomous snakes, scorpions, spiders, and centipedes are all active during the warmer months. Wear shoes or boots at night instead of sandals. Inspect shoes and sleeping bags or bedding before use and always carry a flashlight at night. While snake bites are rare, they usually occur below the knee or elbow. Pay attention to where you walk and place your hands.

Hiking

Exploring this desert and mountain country on foot requires both mental and physical preparation. Trails vary from well maintained in the Chisos to primitive and barely visible in the desert. Plan hikes within your ability. Take along a map and compass and know how to use them. Flash floods may occur following thunderstorms so avoid narrow canyons or dry washes. Stay low and avoid ridges during thunderstorms. Carry a flashlight and a first aid kit. Let someone know where you're going and when you expect to return. If you get hurt or lost, stay in one place to conserve water and energy. Signal for help; three blasts on a whistle is a well-recognized distress call. In remote areas, a large "X" marked on the ground by any means visible from the air will signify that help is needed. Carry a signal mirror. Remember to obtain a free backcountry use permit before heading out overnight.

Heat

Desert heat can kill you. Carry and drink at least one gallon per person, per day. Wear a hat, long pants, long-sleeved shirt, and sun screen when hiking. Springs are unreliable and often dry up for a portion of the year. Avoid hiking during mid-day in summer; travel in the early morning or late evening hours rather than during the heat of the day.

Mountain Lions

Big Bend is mountain lion country, especially the Chisos Mountains. While lion attacks are rare, three have occurred in the last twenty years. Should you encounter an aggressive mountain lion, hold your ground, wave your arms, throw stones, and shout. Never run. Keep groups together and consider hiking elsewhere with young children if you come across a special mountain lion warning sign posted at a trailhead.

Desert Wildlife

Black bears, javelinas, skunks, coyotes, and raccoons frequent Big Bend's campgrounds. Although they sometimes appear tame, all of the animals in the park are wild, and could pose a threat to your health and safety if you attempt to approach or feed them. Never feed any of Big Bend's wildlife. To prevent these creatures from becoming habituated to people, store all food, coolers, cooking utensils, and toiletries in a hard-sided vehicle, preferably in the trunk of your car. Food storage lockers are available for hikers and campers in the Chisos Mountains. Dispose of garbage properly in the special animal-proof dumpsters and trash cans provided. Remember to report all bear or lion sightings to a ranger.

Fire

Fire danger is always an important safety consideration in Big Bend. *Wood or ground fires are not permitted in the park*, and you must exercise caution in the use of gas stoves, charcoal grills, and cigarettes. During drought conditions some restrictions may apply to the use of these heat sources. Check with a ranger for the latest information about fire safety in the park.

Swimming

Hot weather makes the muddy Rio Grande look very inviting, but swimming is not recommended. Water borne micro-organisms and other waste materials can occur in the river and cause serious illness. The river can be hazardous, even in calm-looking water. Strong undercurrents, deep holes, and shallow areas with sharp rocks and large tree limbs are common and make the Rio Grande unsafe for swimming. If you do choose to swim, wear a life jacket and avoid alcohol.

If you really want to swim, Balmorhea State Park (three hours north of Big Bend) boasts the "world's largest spring-fed swimming pool." Contact Balmorhea State Park at 432-375-2370 for more information.

Survive the Sun

In all seasons, whether walking, backpacking, or day hiking, follow these tips to conserve your internal water reserves:

REDUCE YOUR ACTIVITY
During the warmest days, generally from May through August, avoid hiking in the lower elevations during the heat of the day — generally from 10:00 am to 6:00 pm.

FIND SHADE
Shade in the desert means the difference between excessive heat gain from the radiant sun and sheer comfort. In an emergency, a person resting in the shade will survive longer than someone exposed to the sun.

DRINK YOUR WATER
Don't try to conserve the drinking water you have. Whether strolling in the Basin, or hiking the South Rim Trail, you must DRINK your available water. Carry plenty of drinking water -- at least 1 gallon per person per day. Balance your food and water intake. Eat a salty snack every time you take a drink of water.

REDUCE ALCOHOL & CAFFEINE INTAKE
Water is the best remedy for dehydration and listlessness. The diuretic effects of caffeine and alcohol can result in an accelerated loss of body water.

PROTECT YOUR BODY
Our sensitive skin burns easily; it needs shade, sunscreen, sunglasses, a widebrimmed hat, and proper footwear. Dehydration is accelerated by exposed skin, so keep your clothing on. Wear long-sleeved, loose-fitting, light-colored clothes.

Weather and Climate

Weather

Elevational differences in Big Bend mean that temperatures can be vastly different in different areas of the park. The lower areas along the Rio Grande are very hot during the summer months, while the Chisos Mountains are considerably cooler. Winter weather generally occurs between November and February, with temperatures dropping dramatically as cold fronts move through the area. Between June and October thunderstorms and flash floods may occur. Bring clothing for both warm and cool weather, as well as rain gear, when visiting Big Bend any time of the year.

What to Expect in Winter

Winters are generally mild, although periods of cold weather (including light snow or ice) are possible. Fronts and storms can blow in quickly, lowering temperatures throughout the park.

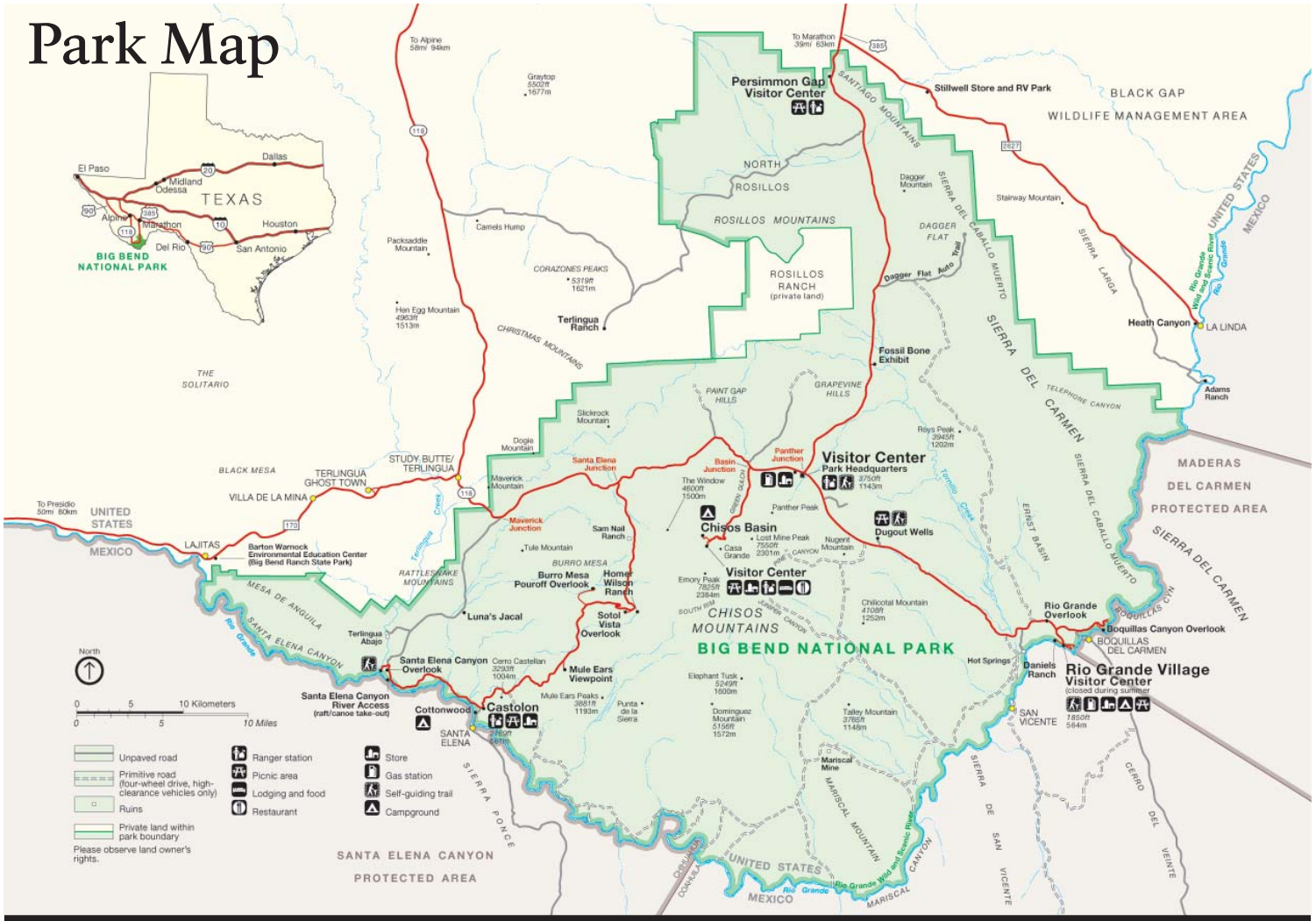
Winter visitors must prepare for a variety of conditions. Rain gear and extra layers of warm clothing are a good idea for all day hikes and backcountry trips.

How Hot Is It?
Average temperatures and rainfall at Panther Junction elevation 3,750 feet

	Avg. High/Low	Avg. Rainfall"
January	61/35	.46
February	66/34	.34
March	77/45	.31
April	81/52	.70
May	88/59	1.50
June	94/66	1.93
July	93/68	2.09
August	91/66	2.35
September	86/62	2.12
October	79/53	2.27
November	66/42	.70
December	62/36	.57
Yearly Avg.	79/47	15.34"

Temperatures in the Chisos Basin vary 5-10 degrees below these readings, while daytime temperatures along the Rio Grande average 5-10 degrees warmer.

Park Map



Local Services | **Big Bend on the Internet: nps.gov/bibe/**

Inside The Park

EMERGENCY — **Call 911**

National Park Service
- General Information — 432-477-2251

Big Bend Natural History Association
- Booksales & Seminars — 432-477-2236

Visitor Centers
- Castolon — 432-477-2666
- Chisos Basin — 432-477-2264
- Panther Junction — 432-477-1158
- Persimmon Gap — 432-477-2393
- Rio Grande Village — 432-477-2271

U.S. Post Office
- Panther Junction — 432-477-2238

Lodging / Restaurant
- Chisos Mountains Lodge — 432-477-2291
  432-477-2292

Park Gasoline Service
- Panther Junction (also diesel) — 432-477-2294
- Rio Grande Village — 432-477-2293

Campground Stores
- Rio Grande Village — 432-477-2293
- Chisos Basin — 432-477-2291
- Castolon — 432-477-2222

Outside The Park

Lodging

Lajitas Resort, Lajitas	877-525-4827
Big Bend Motor Inn, Study Butte	800-848-2363
Easter Egg Valley Motel, Study Butte	432-371-2254
El Dorado Motel, Terlingua	432-371-2111
Gage Hotel, Marathon	432-386-4205
Heath Canyon Ranch Inn, FM 2627	432-376-2235
Longhorn Ranch Hotel, Hwy. 118	432-371-2541
Marathon Motel, Marathon	432-386-4241
Ten Bits Ranch, Terlingua	866-371-3110
Terlingua Ranch Resort	432-371-2416

Camping

Big Bend Motor Inn, Study Butte	800-848-2363
Big Bend Ranch State Park, Lajitas	432-424-3327
Big Bend Travel Park, Study Butte	432-371-2250
Heath Canyon Ranch, FM 2627	432-376-2235
Longhorn Ranch, Study Butte	432-371-2541
Ocotillo Mesa RV Park, Study Butte	800-729-1406
Stillwell's Trailer Camp, FM 2627	432-376-2244
Study Butte RV Park	432-371-2468
Terlingua Ranch Resort	432-371-2416

Convenience Stores/Gasoline

Big Bend Motor Inn (gas/diesel)	800-848-2363
Lajitas Trading Post (gas/supplies)	432-424-3234
Study Butte Store (gas/diesel/groceries)	432-371-2231
Stillwell Store & Station (gas)	432-376-2244

Medical Services

Terlingua Medics	432-371-2536
Lajitas Infirmary	432-424-5111
Big Bend Regional Medical Center, Alpine	432-837-3447

Banks
- Quicksilver Bank & ATM, Study Butte — 432-371-2211

Rio Grande Float Trip Outfitters/Rentals/Guide Services

Big Bend River Tours, Study Butte	800-545-4240
Desert Sports, Terlingua	888-989-6900
Rio Grande Adventures, Study Butte	800-343-1640
Far Flung Outdoor Center, Study Butte	800-839-7238

Horseback Riding

Big Bend Stables, Study Butte & Lajitas	800-887-4331
Spring Creek Remuda, *23 mi. south of Marathon*	432-376-2260

The facilities and services listed here are located within the greater Big Bend area, and vary from 30 to 100 miles from Big Bend National Park. The communities of Terlingua/Study Butte (30 miles west) and Marathon (70 miles north) offer basic services, including gas stations, restaurants, lodging, and campgrounds. Alpine, 90 miles to the northwest of the park is the largest community and offers the greatest number of services.

This listing of local services is a courtesy to our visitors and implies no endorsement by the National Park Service or Big Bend National Park.